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APPLICATION FOR LETTERS PATENT FOR:

COLLAPSIBLE THROWING TOY AND ITS ASSOCIATED
METHOD OF MANUFACTURE

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**COLLAPSIBLE THROWING TOY AND ITS ASSOCIATED METHOD OF
MANUFACTURE**

5 BACKGROUND OF THE INVENTION

1. Field Of The Invention

 In general, the present invention relates to toy
objects that are spring biased in an expanded
10 configuration, yet can be temporarily configured into
a collapsed configuration. More particularly, the
present invention relates to thrown toy objects, such
as balls, that can be temporarily pressed into a
collapsed configuration, wherein the thrown toy pops
15 back into an expanded configuration a short time
later. The present invention also relates to the
method of manufacturing such toy objects.

2. Description Of The Prior Art

20 The prior art is replete with various types of
toys that are intended to be thrown. Prominent among
such toys are balls and discs. It therefore is not
surprising that toy manufacturers eventually combined
the features of a ball and a disc into a single
25 throwing toy.

It is for this reason that collapsible ball
throwing toys were first introduced into the toy
market. Collapsible ball throwing toys are balls, or
similar spherically shaped objects, that are
5 comprised of an upper hemisphere and a lower
hemisphere. The upper hemisphere and the lower
hemisphere are joined together with hinged
connections along a common equatorial joint. Due to
the hinged connections between the upper hemisphere
10 and the lower hemisphere, the upper and lower
hemispheres of the ball can be collapsed flat against
each other. When the upper and the lower hemispheres
of the toy are collapsed against each other, the toy
has the general configuration of a disc. Accordingly,
15 the collapsible ball throwing toy can be configured
as either a ball or as a disc, depending upon whether
or not the toy is compressed.

As the upper and lower hemispheres of the toy
are collapsed into a flat configuration, the
20 diameters of the hemispheres expand. To accommodate
this expansion, the upper and lower hemispheres of
the toy are slotted. When the toy is fully expanded
into its ball shape, the slots are closed and the toy
has a continuous external surface. However, when the

toy is flattened into a disc, the slots open and expand, giving the disc a daisy configuration. A typical daisy configuration of a collapsible ball throwing toy can be seen by referencing U.S. Patent
5 No. Des 434,457 to Goldman, entitled Collapsible Toy.

In the prior art, collapsible ball throwing toys typically have some sort of biasing element that biases the collapsible ball throwing toy into its expanded, ball-like configuration. For example, in
10 U.S. Patent No. 5,797,815 to Goldman, entitled Pop-Open Throwing Toy With Controllable Opening Delay And Method Of Operating Same, a collapsible ball throwing toy is shown that has an internal coil spring. The coil spring biases apart the upper and lower
15 hemispheres of the toy. The collapsible ball throwing toy can be temporarily configured like a disc by compressing the internal coil spring and resisting the bias of the coil spring with a momentary suction cup connection between the upper and lower
20 hemispheres. As soon as the momentary suction cup connection fails, the internal coil spring pops the collapsible ball throwing toy back into its expanded ball-like configuration.

In U.S. Patent No. 4,955,841 to Pastrano,
entitled Disc-Shaped Throwing Toy, a collapsible ball
throwing toy is disclosed. The collapsible ball
throwing toy is shaped like a polyhedron. The
5 collapsible ball throwing toy has an upper and lower
hemisphere joined with a hinged connection along an
equatorial joint. When compressed, the hemispheres
flatten along lines in the polyhedral pattern and
expand at the equatorial joint. Due to the hinged
10 connection at the equatorial joint, the upper and
lower hemispheres can fold flat against each other.
However, once a compressing force is removed, the
memory of the material used to make the polyhedral
configuration causes both hemispheres to slowly
15 return to their expanded shapes. As such, the
collapsible ball throwing device can be flattened and
thrown. After being thrown, the collapsible ball
throwing device slowly returns to its expanded
spherical shape. This prior art design, therefore,
20 lacks the desired sudden transition between its
collapsed condition and its expanded condition that
other prior art versions of the collapsible ball
throwing toy embody.

In the manufacturing of prior art collapsible ball throwing toys, one of the controlling costs is how to form the biasing mechanism that biases the toy into its expanded form. If a coil spring is used, there is the cost of the coil spring and the configurations needed to retain the coil spring. If the shell of the collapsible ball throwing toy is used as the biasing mechanism, a complicated shell configuration must be used that greatly increases the costs involved in tooling and assembling the toy. Furthermore, it is desirable that the collapsible ball throwing toy suddenly pop between its flat configuration and its expanded configuration. The collapsible ball throwing toy must therefore have a strong biasing mechanism and an equally strong temporary connecting mechanism that temporarily resists the biasing mechanism. Such connecting mechanisms also add significantly to the cost of manufacture.

A need therefore exists for a collapsible ball throwing toy that can be simplified in its construction so that it can be manufactured less expensively and operate better than prior art

configurations. This need is met by the present invention as described and claimed below.

SUMMARY OF THE INVENTION

5 The present invention is a toy assembly and its method of manufacture. The toy assembly is a ball or similar object that can be temporarily compressed into a disc-shaped object. A short time after compression, the toy pops back into its original
10 ball-like shape.

 The toy assembly has a plurality of shell sections that join along at least one joint line to form a generally spherical body. The shell sections are symmetrically disposed around a central axis. The
15 spherical body is bisected by an imaginary equatorial plane that is perpendicular to the central axis. The joint lines between shell sections exist in meridian planes that are perpendicular to the equatorial plane.

20 A connector mechanism is provided that has two opposing components that temporarily connect when brought into abutment. The opposing components are disposed within the spherical body in line with the central axis. The shell sections used in the toy are

flexible and enable the spherical body of the toy to be compressed into a non-spherical shape. When in this non-spherical shape, the opposing components of the connector mechanism abut and temporarily connect.

5 The shell sections provide a spring bias that resists compression and causes the shell sections to return to a spherical shape when the opposing components of the connector mechanism release. The toy therefore pops back into its spherical shape after remaining
10 compressed for a period of time.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference is made to the following
15 description of an exemplary embodiment thereof, considered in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of an exemplary
20 embodiment of the present invention shown in its expanded condition;

FIG. 2 is a perspective view of the embodiment of Fig. 1 shown in its compressed condition;

FIG. 3 is an exploded perspective view of the embodiment of the invention shown in Fig. 1 and Fig. 2; and

5 FIG. 4 is a cross-sectional view of the exemplary embodiment.

DETAILED DESCRIPTION OF THE DRAWINGS

10 The present invention is a collapsible ball throwing toy and its associated method of manufacture. Referring to Fig. 1, an exemplary embodiment of a collapsible ball throwing toy 10 is shown. The collapsible ball throwing toy 10 has a
15 spherical body 12 that is made from two molded hemispherical sections 14, 16. Both of the two hemispherical sections 14, 16 are partially joined together along a common joint 18.

 The spherical body 12 is symmetrically disposed
20 around a central axis 20. The common joint 18 runs as a meridian line relative the central axis 20, wherein the central axis and the common joint 18 exist in a common plane.

 Two end hub assemblies 21, 22 are provided. The
25 end hub assemblies 21, 22 are disposed at opposite

ends of the spherical body 12, but both end hub
assemblies are positioned along the central axis 20
of the collapsible ball throwing toy 10. As such, the
common joint 18 between the two hemispherical
5 sections 14, 16 of the spherical body 12 intersects
both end hub assemblies 21, 22 as the joint line 18
encircles the spherical body 12.

If the end hub assemblies 21, 22 are considered
to be positioned along the same central axis 20 at
10 different pole ends of the spherical body 12, an
imaginary equatorial plane 24 exists between the end
hub assemblies 21, 22. The equatorial plane 24
bisects the spherical body 12. Accordingly, the
common joint 18 that connects the two hemispherical
15 sections 14, 16 extends in a meridian plane that is
perpendicular to the equatorial plane 24.

As will later be more fully described, a
mechanical connector, such as a suction cup, is
disposed inside the spherical body 12 of the
20 collapsible ball throwing toy 10 behind one of the
end hub assemblies 21. A surface that can be
temporarily engaged by the mechanical connector is
disposed inside the spherical body 12 of the

collapsible ball throwing toy 10 behind the opposite end hub assembly 22.

5 The hemispherical sections 14, 16 that form the spherical body 12 of the collapsible ball throwing toy 10 are made from flexible, yet resilient plastic. Each of the hemispherical sections 14, 16 is molded as a unistructural plastic piece, having no prefabricated folding lines or joints. Slots 26 are symmetrically formed in each of the hemispherical sections 14, 16. The slots 26 extend in straight meridian lines from one end hub assembly toward the other. However, each of the slots 26 has an arcuate length that is less than half of the circumference of the spherical body 12. As such, each slot 26
10 terminates at an end prior to reaching one of the end hub assemblies 21, 22. Each of the slots 26 also extends in a meridian plane that is perpendicular to the imaginary equatorial plane 24 of the spherical body 12.

20 Slots 28 also exist between the hemispherical sections 14, 16 along the meridian of the common joint 18. As such, it will be understood that only small sections of the two hemispherical sections 14,

16 are physically joined together along the common joint 18.

Referring to Fig. 2 in conjunction with Fig. 1, it can be seen that the spherical body 12 of the collapsible ball throwing toy 10 can be altered into a disc shape by pressing the two end hub assemblies 21, 22 toward each other. The two end hub assemblies 21, 22 meet at the imaginary equatorial plane 24 of the spherical body 12. As the two end hub assemblies 21, 22 approach one another, the mechanical connector behind one end hub assembly 21 temporally engages a structure under the opposing end hub assembly 22. As the two hemispherical section 14, 16 are compressed, they each bend and spread at the slots 26, 28.

However, there is no hinged joint where the equatorial plane 24 passes through the hemispherical sections 14, 16. Rather, each of the hemispherical sections 14, 16 produces a wide, curving bend 30 in the equatorial plane 24. The wide bend 30 creates a spring bias in each of the hemispherical sections 14, 16 that opposes the compression. This spring bias causes the two hemispherical sections 14, 16 to immediately pop back into a spherical shape the instant the compression force is released or the two

end hub assemblies 21, 22 release their
interconnection. As such, the hemispherical sections
14, 16 themselves act as spring biasing mechanisms
that bias the collapsible ball throwing device 10
5 into a ball-like shape.

Referring to Fig. 3, it can be seen that each of
the hemispherical sections 14, 16 is a plastic molded
element that is unistructural in its construction.
Preferably, both of the hemispherical sections 14, 16
10 are identical in construction. As such, only a single
plastic injection mold needs to be created to form
both of the hemispherical sections 14, 16.

Depressions 15 are formed along the interior of
each of the hemispherical sections 14, 16. The
15 depressions do not extend through the hemispherical
sections 14, 16 but merely represent places where the
wall thickness of the hemispherical sections 14, 16
are thinned. The depressions 15 fall along the line
of the equatorial plane 24 (Fig. 2) and help the
20 hemispherical sections 14, 16 bend along the
equatorial plane without creasing, as was shown in
Fig. 2.

Interior recesses 32 and exterior recesses 34
are formed at the ends of each of the hemispherical

sections 14, 16. The recesses 32, 34 serve two purposes. First, the recesses 32, 34 leave room for the end hub assemblies 21, 22 so that the end hub assemblies 21, 22 need not protrude. Second, the recesses 32, 34 help to interconnect the two hemispherical sections 14, 16, as will be explained.

On one side of each hemispherical section 14, 16 a large opening 37 is present through the material that extends from the interior recess 32 to the exterior recess 34. On the opposite end of each hemispherical section 14, 16, a cylindrical protrusion 38 extends outwardly from the exterior recess 34. The two hemispherical sections 14, 16 are joined together in opposite orientations. As such, the cylindrical protrusion 38 of one hemispherical section 16, can pass into the opening 37 on the opposite hemispherical section 14, therein mechanically interlocking the two hemispherical sections 14, 16 together.

Within the region of the recesses 32, 34 at either end of the spherical body 12 are also defined a first plurality of mounting holes 42. The first plurality of mounting holes 42 are used to

interconnect the end hub assemblies 21, 22 with the hemispherical sections 14, 16, as is described below.

Each end hub assembly 21, 22 includes a base plate 40 that mounts inside the spherical body 12 created by the two hemispherical sections 14, 16. The base plate 40 rests within an interior recess 32 of the hemispherical sections 14, 16 on either side of the spherical body 12. The interior recesses 32 and the base plates 40 are both preferably
complimentarily shaped so that the interior recesses 32 receive the base plates 40 and prevent the base plates 40 from rotating.

Each base plate 40 defines a central opening 44 and a second plurality of mounting holes 46. The central opening 44 is coaxial with the cylindrical protrusion 38 and the opening 37 in the hemispherical sections 14, 16. The second plurality of mounting holes 46 in the base plate 40 align with the first plurality of mounting holes 42 in the hemispherical sections 14, 16. As such, by shaping the internal recess 32 and the periphery of the base plate 40, the mounting holes 46 in the base plate 40 will automatically align with the mounting holes 42 in the

hemispherical sections 14, 16 by placing the base plates 40 into the interior recesses 32.

5 The base plates 40 are held into place by hubs 45. Each hub 45 has a smooth convex exterior 47 that matches the radius of curvature of the hemispherical sections 14, 16. Locking fingers 48 extend from the hub 45. Referring to Fig. 4 in conjunction with Fig. 3, it can be seen that the locking fingers 48 from the hub 45 extend through the mounting holes 42 (Fig. 10 3) in the hemispherical sections 14, 16 and the mounting holes 46 in the base plate 40. The mounting holes 46 in the base plate 40 and the locking fingers 48 are configured to mechanically engage each other. As such, once the locking fingers 48 are pushed 15 through the mounting holes 46 in the base plate 40, the locking fingers 48 engage the base plate 40 and cannot be non-destructively removed.

Each base plate 40 defines a central opening 44 (Fig. 3). These openings 44 receive part of a 20 mechanical connector 50. In the shown embodiment, the mechanical connector 50 includes a suction cup 52. One of the mounting plates 40 will receive and retain a suction cup 52. The mounting plate 40 on the opposite side of the toy will receive a plate element

54 that can be engaged by the suction cup 52. As such, when the end hub assemblies 21, 22 are pressed together, the suction cup 52 from one hub assembly will engage the plate element 54 of the second end hub assembly and the two end hub assemblies 21, 22 will remain interconnected for a short period of time.

The suction cup 52 and plate element 54 can be glued in place. However, to help these components from disconnecting from the hub assemblies 21, 22, small pins or other mechanical connecting structures can be used to secure the suction cup 52 and the plate element 54 to the hub assemblies 21, 22.

What resists the interconnection between the suction cup 52 and the suction plate element 54 is the spring bias created by the deformation of the two hemispherical sections 14, 16. Referring now solely to Fig. 4, it can be seen that when the two end hub assemblies 21, 22 engage each other, the hemispherical sections 14, 16, bend between the slots 26, 28. There is no hinge point along the length of either hemispherical section 14, 16. As such, each hemispherical section 14, 16 acts as a spring and stores potential energy as it bends. The spring bias

acts to pull the two end hub assemblies 21, 22 away from each other so that that the hemispherical sections 14, 16 can return to their original combined ball-like shape. The depressions 15 formed in the hemispherical sections 14, 16 help the hemispherical sections 14, 16 to bend evenly without creasing.

The spring bias created by the bent hemispherical sections 14, 16 acts to pull the two end hub assemblies 21, 22 apart. This spring bias force eventually causes the suction cup 52 to pull away from the suction plate element 54. As soon as this occurs, the spring bias in the hemispherical sections 14, 16 cause the collapsible ball throwing toy 10 to instantly pop back into its ball-like shape.

By providing no hinged connections in between the opposing end hub assemblies 21, 22, the hemispherical sections 14, 16 can provide a spring bias force that was previously only achievable through the use of an auxiliary coil spring. Since the spring bias is now inherent in the structure of the hemispherical sections 14, 16, no auxiliary spring is needed. Additionally, the spherical body 12 of the present invention collapsible ball throwing

toy 10 is formed from identical molded shell sections. Furthermore, the hub assemblies used to hold the shell sections together also share identical components and can be assembled without the use of heat bonding, adhesives or any other secondary procedures. The present invention collapsible ball throwing toy 10 can therefore be manufactured with less parts and at a much lower cost than prior art products in the same category.

It will be understood that the embodiments of the present invention collapsible ball throwing toy that is described and illustrated herein are merely exemplary and a person skilled in the art can make many variations to the embodiment shown without departing from the scope of the present invention. For example, the suction based mechanical connector 50 that is used to interconnect the end hub assemblies 21, 22 can be varied. Alternate connectors, such as Velcro, can be use in place of the suction cup, provided the connector provides a temporary interconnection after the toy is compressed. Furthermore, there are many ways that the end hub assemblies can be configured. The design described for the end hub assemblies is merely

exemplary. Other configurations can be used provided the end hub assemblies provide the described function of holding the hemispherical sections together and providing a temporary interconnection when
5 compressed.

In the described embodiment, two hemispherical sections 14, 16 are used to form the spherical body 12 of the toy. In alternate embodiments, more than two shell sections can be used. Any plurality of
10 shell sections can be used in forming the present invention provided that the shell sections join along meridian lines in planes that are perpendicular to the equatorial plane of the toy. In this manner, each section will resiliently bend when the toy is
15 compressed and will provide a spring bias that acts to return the toy to its original ball-like shape. All such variations, modifications and alternate embodiments are intended to be included within the scope of the present invention as defined by the
20 appended claims.